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TECHNICAL ABSTRACTS

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LEAD ABSTRACTS

A Selection of Abstracts of Literature and Patents on the Utilisation of Lead and its Alloys

No. 6 FEBRUARY 1960

Technical Papers 295 to 324
Patents 325 to 352

ISSUED BY THE

LEAD DEVELOPMENT ASSOCIATION

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ALLOYS

295 CARBIDE PROCESS FOR THE PRODUCTION OF LEAD-CALCIUM HARDENING ALLOY *V. V. Rodyakin*

Tsvetnye Metally, April, 1958, 31(4), 43-49.

(In Russian.) Lead-calcium carbide and aluminium are heated together with calcium chloride to produce an alloy containing 2.5 to 3% calcium for use in debismuthising lead.

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296 ELECTRIC RESISTANCE OF MOLTEN METALS. 4.—THE ELECTRIC RESISTANCE OF MOLTEN GOLD-TIN, GOLD-LEAD AND SILVER-LEAD ALLOYS *A. Roll and E. Uhl*

Z. Metallkunde, March, 1959, 50(3), 159-165.

(In German.) Effect on the resistivity of molten alloys of changes in temperature and composition.

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297 LEAD AND ITS ALLOYS AS CHEMICAL ENGINEERING MATERIALS OF CONSTRUCTION *E. J. Mullarkey*

Ind. Eng. Chem., Sept., 1959, 51(9), Part II, 1185-1189.

A general paper on developments, uses and properties of lead and its alloys.

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298 LITHIUM . . . THE LIGHTEST METAL *F. B. Litton*

Met. Progress, Aug., 1959, 76(2), 94-96, 96B.

A short account of uses of lithium and its alloys, including its alloys with lead. Binary diagram lithium-lead is reproduced.

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299 METAL POWDERS GIVE LEAD STRENGTH

Chem. and Eng. News, Aug., 1959, 37(32), 50.

Discussion of lead-cemented alloys developed by Battelle for Lead Industries Association.

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300 7th INTERNATIONAL COLLOQUIUM ON SPECTROSCOPY, SEPTEMBER, 1958 *"Revue Universelle des Mines"*

Rev. Universelles des Mines, May, 1959, 15(15), 217-604.

Among the papers is one entitled "Ternary Lead Alloys. Spectrographic Analysis and Effect of Thermal History" by E. A. Alvarez-Arenas and A. S. Pineiro (pp. 303-306: In French).

301 SPECTROGRAPHIC ANALYSIS OF ZINC, LEAD AND COPPER-BASE ALLOYS *P. T. Beale*

Met. Ind., Sept. 25, 1959, 95(7), 139-140.

Account of experience with the Hilger medium spectrograph employing a direct-reading attachment. Discusses technique, choice of lines and limits.

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302 VAPOUR PRESSURE MEASUREMENTS ON MOLTEN ZINC-TIN AND MAGNESIUM-LEAD ALLOYS *E. Scheil and F. Wolf*

Z. Metallkunde, April, 1959, 50(4), 229-233.

(In German.) Measurement of vapour pressure of magnesium over magnesium lead alloys (0–33% lead) at 743–829°C. Calculation of activities and heats of mixing.

ANODES

303 LEAD ANODES FOR CHROMIUM PLATING *H. R. Friedberg*

Plating, July, 1959, 46(7), 834-836.

Describes results of a laboratory investigation. Performance of lead anodes said to depend on shaping and design, evidence of dead space or dead areas, and good contact with copper hook. Round anodes are preferred.

BATTERIES

304 FUNDAMENTAL STUDIES OF THE LEAD-OXYGEN SYSTEM *E. J. Ritchie and E. G. Brockman*

Office of Naval Research NE 052-349, July, 1958.

Considers use of oxides in batteries and pigments. Also covers the weathering of metallic lead.

CABLES

305 CATHODIC PROTECTION OF LEAD CABLE SHEATH *W. H. Bruckner and O. G. Jansson*

Corrosion, July, 1959, 15(7), 389.

Laboratory tests at high pH values are described and results are used to define cathodic protection requirements as a function of pH.

COATINGS

306 CATHODIC OR ELECTROCHEMICAL RUST PROTECTION ? *H. Hebberling*

Werkstoff u. Korrosion, June, 1959, 10(6), 376-377.

Discusses relative merits of white-lead-based paints, zinc or aluminium coatings, and zinc or magnesium anodes.

---

307 PROTECTION OF LEAD-SHEATHED UNDERGROUND CABLES FROM CORROSION *J. E. Johnson*

Corrosion, Aug., 1959, 15(8), 423t-427t.

Design of anodes, spacing and field installation are described.

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308 DIFFERENTIAL AERATION CORROSION OF SHEATHING IN UNDERGROUND TELEPHONE CABLES *D. T. Jones*

Corrosion, Sept., 1959, 15(9), 116-118.

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309 CORROSION OF CHEMICAL APPARATUS *G. L. Schvartz and M. Kristal*

Book, 1959. (Translation from Russian.) 250 pp. Consultants Bureau Inc., New York (Chapman and Hall Ltd., London). £3.

Russian book published in 1958. The term "corrosion cracking" appears to mean stress-corrosion. In addition to dealing with various steels, lead and other non-ferrous metals and alloys are discussed.

EXTRUSION

310 THE EFFECT OF PROCESS VARIABLES ON EXTRUSION PRESSURES OF LEAD *J. Frisch and E. G. Thomsen*

Jour. of Eng. for Ind., Aug., 1959, 81(3), 207.

Discusses relationship between extrusion pressures, die contours and ram speeds.

FORGINGS

311 LEAD FORGINGS MACHINE EASILY

The Iron Age, Sept., 1959, 184(10), 88.

Leaded forgings are shown by recent field studies to have superior machining characteristics.

---

312 THEORY AND EXPERIMENT OF PRESS FORGING AXISYMMETRIC PARTS OF ALUMINIUM AND LEAD *S. Kobayaski et al*

Jour. of Eng. for Ind., Aug., 1959, 81(3), 228.

Analysis of the mechanics of finishing in press-forging operations.

GLASS

313 PORCELAIN ENAMELS FOR ALUMINIUM AND MAGNESIUM *N. H. Stradley*

Amer. Ceram. Soc. Bull., Aug., 1959, 38(8), 401-404.

Review of last 40 years development of porcelain enamels. Glass systems (with or without lead) suitable for enamelling aluminium, are discussed.

LEAD — GENERAL

314 BETTER WAY TO LEAD-LINE YOUR WOODEN TANKS *A. E. Hughes*

Chem. Eng., Sept., 1959, 66(18), 158.

Describes the use of lead supporting tabs.

---

315 EXAMPLES OF BEHAVIOUR OF LEAD IN SERVICE *W. Hofman and H. von Malotki*

Metall, Aug., 1959, 13(8), 747-749.

(In German.) General discussion covering, among other things, homogeneous lead lining, cold welding to steel or aluminium and creep in compression.

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316 INVESTIGATION ON THE DECOPPERING OF LEAD IN THE PRESENCE OF TIN, ARSENIC AND ANTIMONY. PART I. *H. Hartmann, F. Ensslin and E. Wunderlich*

Erzmetall, Aug., Sept., 1959, 12(8, 9), 374-381, 437-443.

(In German.) Describes research intended to reveal the mechanism of decoppering of lead by sulphur.

317 INVESTIGATION OF THE THERMODYNAMIC PROPERTIES OF LIQUID METAL SOLUTIONS IN THE MAGNESIUM-LEAD SYSTEM *M. F. Lantratov*

Zhur. Neorg. Khim., June, 1959, 4(6), 1415-1419.

(In Russian.) Measurement of e.m.f. of concentration cells, $Mg/MgCl_2+(KCl, LiCl, NaCl)/Mg-Pb$ at 650–750°C. Various thermodynamic properties of magnesium-lead alloys are also calculated.

---

318 OXIDE PHASES OF LEAD AND THEIR CRYSTAL STRUCTURES *M. Stammler*

Metall, Aug., 1959, 13(8), 750-752.

(In German.) A survey of knowledge of various oxides with the object of clarifying ranges of existence of suggested oxides.

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319 VAPOUR PRESSURE CURVE, BOILING POINT AND DISSOCIATION OF LEAD MONOXIDE *R. Hörbe and O. Knacke*

Erzmetall, July, 1959, 12(7), 321-324.

(In German.) Boiling point is determined as being 1580°C and reasons are given for accepting this figure rather than the existing value of 1472°C.

METALLURGY

320 SOME NEW DEVELOPMENTS IN NON-FERROUS METALLURGY *E. C. Mantle*

F.B.I. Review, Aug.-Sept., 1959, pp. 43-46.

Description of progress in the non-ferrous metals industry. Continuous casting methods and powder metallurgy are among the subjects covered.

REFINING

321 COMPARISONS BETWEEN FREE ENERGIES OF ACTIVATION FOR GRAIN GROWTH, GRAIN-BOUNDARY SELF-DIFFUSION, AND LIQUID SELF-DIFFUSION *E. L. Homes and W. C. Winegard*

Canadian Jour. of Phys., Aug., 1959, 37(8), 899.

Discusses grain-growth in zone-refined lead and tin.

SINTERING

322 EXPERIMENTS ON THE USE OF OXYGEN IN THE SINTERING OF LEAD CHARGES — *V. I. Milent'eva and G. I. Gnatyshenko*

Tsvetnye Metally, May, 1958, 31(5), 38-44.

(In Russian.) By increasing oxygen content of air in sinter roasting the output from a charge containing 31–32% lead, 6–6.5% sulphur was nearly doubled.

WELDING

323 PROGRESS IN THE FUSION WELDING OF NON-FERROUS ALLOYS — *J. G. Young*

Sheet Met. Ind., Aug./Sept., 1959, 36, 557-566, 576.

Survey of mechanical and manual methods of non-ferrous fusion welding. Metallurgical factors affecting choice of process, technique and filler for sheet materials, including lead and lead-rich alloys.

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324 JOINING DISSIMILAR METALS — *J. G. Young and A. A. Smith*

Welding and Met. Fabrication, July, 1959, 27(7), 275-281. In progress.

Covers combinations of various metals and alloys including lead. Principles and applications of various joining processes, metallurgical principles and uses of special techniques are described.

PART II

PATENTS

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ERRATUM

Technical Abstracts No. 5, page 12, No. 279:
Indian Patent No. 6380 should read *63080*, not *6380*.

ALLOYS

325 BRITISH PATENT 814,594. "LEAD ALLOYS CONTAINING SELENIUM AND TELLURIUM"

MINNESOTA MINING AND MANUFACTURING CO.

Lead alloys containing 26.5–38.05% (selenium + tellurium) used with a promotor element for thermoelectric generators.

ANALYSIS

326 RUSSIAN PATENT 121,282. "QUANTITIVE COLORIMETRIC DETERMINATION OF LEAD"

A. M. LUKIN

A method is described of using 4''-nitrobenzene 1'' : 4-diazoamino-1 : 1'-azobenzene-2''-arsenic acid for the extraction and the determination of lead in solution. At pH9 this reagent will give colours ranging from yellow to red according to the amount of lead present. The sensitivity claimed is 0.5 micrograms lead in 500 ccs.

ATOMICS

327 AUSTRALIAN PATENT 44,479/58. "LEAD SHIELDS"

KNAPP MILLS INC.

A layer of molten lead is formed in an enclosure and the rate and direction of cooling is controlled, thereby producing a uniform density in the finished product.

BATTERIES

328 BRITISH PATENT 812,537. "BATTERY GRID LEAD ALLOY CONTAINING TIN, ARSENIC AND SILVER"

GOULD-NATIONAL BATTERIES, INC.

A new lead alloy for battery grids with a composition in the range 0.5–3% tin. 0.2–0.5% arsenic and 0.05–0.35% silver, balance lead.

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329 BRITISH PATENT 812,920. "PLATES FOR LEAD-ACID SECONDARY BATTERIES"

CROMPTON PARKINSON LTD.

Plates are manufactured by punching and pasting two continuous strips of lead foil which are later wound into a spiral along with a continuous separator.

330 BRITISH PATENT 824,025. "BATTERY SEPARATOR"

CHLORIDE ELECTRICAL STORAGE CO. LTD.

Separators are produced by passing resin impregnated felted fibrous sheet material on to a conveyor on which laths are mounted. The conveyor passes beneath a drum, on which ribs force the sheet material into the gaps between the laths. As the material progresses further the gaps between the laths decrease and the sheet material is thereby squeezed, forming ribs on the sheet. The material is then passed into a curing oven which causes the resin to set and consolidates the ribs permanently in position. The final stage is for the laths on the conveyor to separate slightly and so release the hardened sheet material.

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331 SOUTH AFRICAN PATENT 59/2693. "NEGATIVE PASTES"

CHLORIDE ELECTRICAL STORAGE CO. LTD.

A small amount of lanolin from 0.01% to 0.3%, by weight of the dry oxide, is incorporated in the pastes for the negative plates.

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332 BRITISH PATENT 819,626. "BATTERY SEPARATOR"

TENON INC.

This battery separator comprises a thin paper base web with integral ribs protruding from one side of the unit. The whole is impregnated with a phenol-formaldehyde resin and while the latter is in the B-stage, pressure is applied in such a manner that the high portions of the ribs are subjected to a greater pressure than the lower portions and the areas between the ribs. The resin is thus forced to flow away from the high parts of the ribs. It is claimed that by these means those portions of the ribs in contact with the battery plates have improved resistance to abrasion and oxidation.

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333 GERMAN PATENT 1,065,044. "INTERLOCKING CELLS"

AKUMULATOR FABRIK SONNENSCHIEN B.H.

The side walls of individual cells are fitted with recesses and projections to match those of adjoining cells. These projections interlock and prevent one cell sliding relative to another. On assembly, the whole is cemented or welded together.

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334 S. AFRICAN PATENT 2270/59. "TUBULAR PLATES"

CHLORIDE BATTERIES LTD.

The positive tubular type plate for a lead-acid battery has tubes made from woven, knitted or braided yarn, the latter being treated with silicone material before or after forming.

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335 BRITISH PATENT 823,195. "DRY CHARGED BATTERIES"

GENERAL MOTORS CORPN.

A disadvantage of dry charged lead-acid batteries is that the impregnated paper or plastic separators often resist wetting by the electrolyte and, as a consequence, do not immediately develop full voltage when the electrolyte is added. In this invention the separators are treated with a wetting agent such as trimethyl monylether of polyethylene glycol.

336 AUSTRALIAN PATENT 46,634/59. "DRY CHARGED BATTERIES"
ELECTRIC STORAGE BATTERIES CO.

The sponge lead on the negative plate is exposed to the vapour from a petroleum fraction, boiling at about 300°C. In this way all the surfaces of the sponge lead become coated with the condensed vapour. The plates are subsequently heated in an inert atmosphere to dry off excess material, but a sufficient residue of the hydrocarbon is left to ensure a thorough coating of the spongy lead.

BEARINGS

337 RUSSIAN PATENT 121,937. "BEARING METAL"
A. P. KLEVCHIKOV

This alloy, which is based on aluminium, contains 32/34% of lead and 6/8 of antimony as well as copper, silicon, iron and magnesium. It finds use in petrol and diesel engines.

CABLES

338 BRITISH PATENT 816,808. "LEAD ALLOYS FOR CABLE SHEATHING"
BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION

Alloys having compositions in the range 0.1–1% antimony, 0.01–0.05% arsenic and possibly 0.005–0.1% tellurium are claimed to have good fatigue resistance and structural stability at elevated temperatures.

CASTING

339 BRITISH PATENT 815,042. "CASTING METAL BALLS"
BISCHOFF, I.A. and RHODESIAN CASTINGS LTD.

Describes a machine for casting metal balls for use in ball mills. The moulds are mounted in balanced pairs, one discharging as the other is ready for pouring.

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340 BRITISH PATENT 824,057. "FORMATION OF HOT RISERS BY EXOTHERMIC MATERIALS"
FOUNDRY SERVICES LTD.

This patent describes a collapsible or dismountable template fitted to the top of a mould. This enables both exothermic and refractory material to be placed in position, after which the template can be taken to pieces and lifted out of the mould.

CORROSION

341 BRITISH PATENT 814,445. "CORROSION RESISTANT LEAD ALLOY"
BRITISH LEAD MILLS LTD.

An alloy containing 0.02–0.1% silver, 0.04–0.065% tellurium, is claimed to resist attack by chromium trioxide and therefore to be suitable for lining chromium plating vats.

342 BRITISH PATENT 819,624. "PROTECTION OF SOLDERED JOINTS"

AMERICAN CHEMICAL PAINT CO.

Joints between Aluminium and Copper or their alloys made with a lead-tin solder may be protected from subsequent corrosion by treatment with an aqueous solution of chromic acid or chromate or dichromate and a strong mineral acid such as hydrochloric, nitric or sulphuric. The concentration of CrO_3 should be between 20 and 75 g/l and the acidity between 0.2 and 1.0 Normal.

ELECTRONICS AND ELECTRICAL

343 BRITISH PATENT 824,072. "FERROMAGNETIC MATERIAL"

PHILIPS ELECTRICAL INDUSTRIES LTD.

The Ferromagnetic material covered by this patent consists of mixed crystals of the oxides of several metals including lead.

EXTRACTION

344 GERMAN PATENT 1,063,543. "FLOTATION CELLS"

WESTFALIA DINNENDAHL GROPPEL A.G.

Baffle bars on the stirrers of flotation cells are made of rubber or other flexible material. They are sprung into position and do not need metal parts such as screws for mounting. Superior abrasion resistance is claimed for this device.

GLASS

345 BRITISH PATENT 822,272. "LEAD GLASSES"

CORNING GLASS WORKS

A number of compositions are given of lead glasses having litharge contents ranging from 71.5% to 80%. This material finds use in sealing glass to metals or ceramics having expansion coefficients in the order of 80/120 x 10^{-7}/°C.

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346 BRITISH PATENT 822,273. "REMOVAL OF GLASS"

CORNING GLASS WORKS

The lead borate sealing glasses described above can be removed by immersion in a bath of nitric acid about 1.5 to 2N at a temperature of 70/80°C.

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347 RUSSIAN PATENT 124,605. "LEAD GLASS"

H. A. MILYAEVA

This glass, containing 35% of litharge, has high electrical insulating properties and a good heat resistance. It can be easily joined to metal and its softening point is in the neighbourhood of 600°C.

MISCELLANEOUS

348 BRITISH PATENT 820,943. "LUMINESCENT MATERIAL"

PHILIPS ELECTRICAL INDUSTRIES LTD.

This patent describes the production of ultra-violet luminescent material which when irradiated by radiation from a gas discharge tube gives maximum emission in the range 3,200 to 3,700°A. The concentration of ingredients must be controlled within limits and in particular the atomic proportions of lead should be more than 0.003 but less than 0.02. A convenient way of adding the lead is by means of an accurately known amount of a dilute solution and evaporating the whole mass to dryness.

REFINING

349 BRITISH PATENT 824,216. "REFINING"

BRITISH OXYGEN CO. LTD.

One of the existing methods of removing antimony from lead consists of blowing air through the molten impure metal, a process which can be very slow. The patent describes a device by which molten lead is broken up into fine droplets and allowed to fall down a hollow tower. An oxidising atmosphere such as gaseous oxygen is injected into the bottom of the tower. In an example quoted molten lead containing 4% antimony at 650°C was poured at a rate of 100 lbs./min. down a tower 9′ high and 8″ i.d. Gaseous oxygen was passed into the lower end of the tower at the rate of 430 cu. ft./hr. In one pass the antimony content was reduced from 4% to 0.1%.

SMELTING

350 BRITISH PATENT 819,931. "CUPOLA FURNACE WITH ADJUSTABLE TUYERE"

M. de BOCK

An increase or decrease in the air supply is effected by enlarging or reducing the effective cross-sectional area of the tuyere nozzle and at the same time varying the air supply to the tuyere. The object of this device is to ensure that the velocity of the air leaving the nozzle is always the same.

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351 GERMAN PATENT 1,067,918. "SEMI-CONDUCTOR RESISTANCE"

SIEMENS & HALSKE A.G.

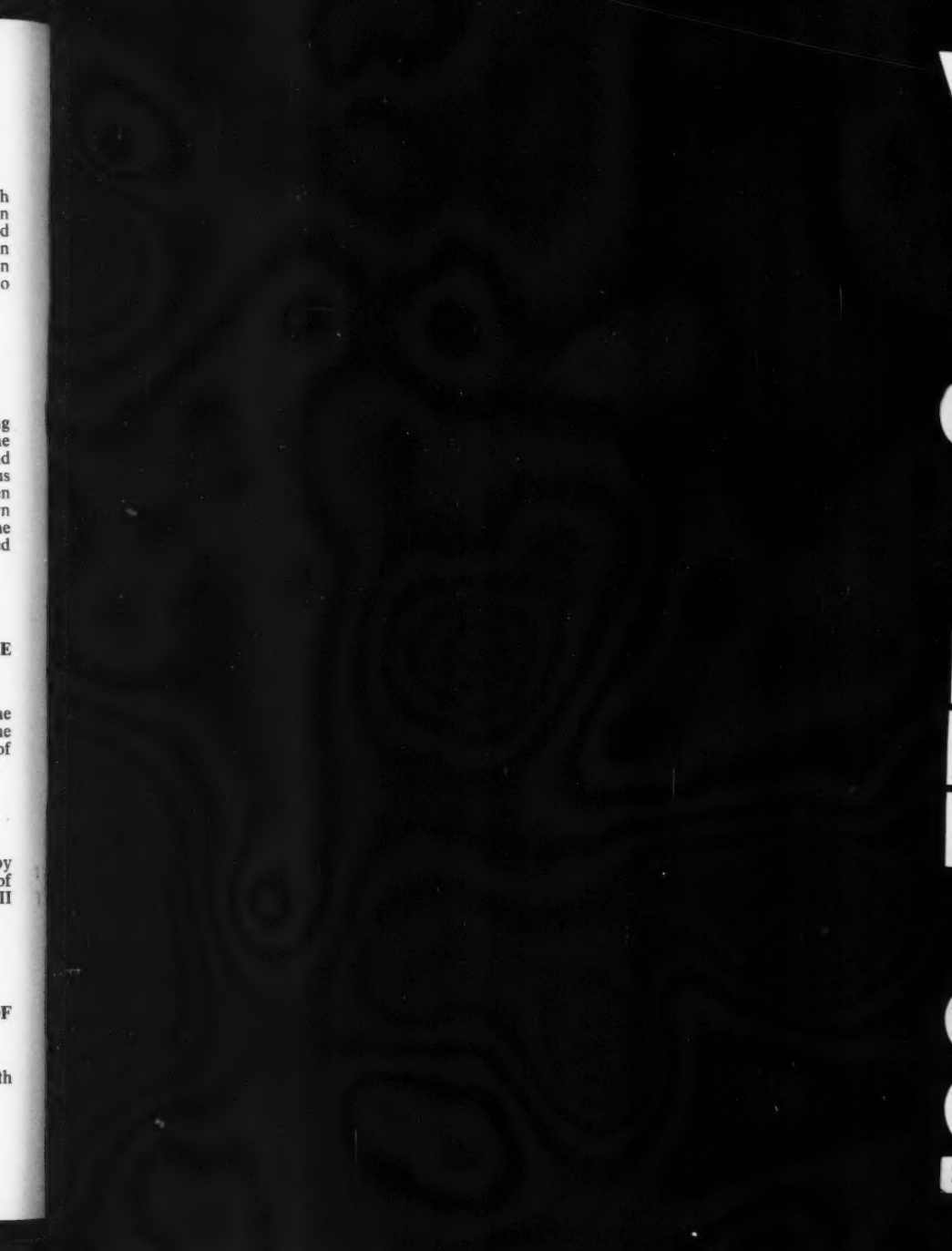
This resistance has a negative current-voltage characteristic. It is formed by embedding a granular semi-conductor, preferably silicone carbide, in a mixture of metal oxides consisting of litharge and at least one other stable oxide of a group II or group IV metal or the material Perowskite (BaPb) (TiSn) 0_3.

SOLDER

352 BRITISH PATENT 813,586. "APPLYING SOLDER AT A PLURALITY OF POSITIONS"

STANDARD TELEPHONES AND CABLES LTD.

A series of soldering bits, one for each position, is raised vertically through a bath of molten solder.



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